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New records and range extension of *Trimorphodon tau* Cope, 1869 (Squamata, Colubridae) in Nuevo León, México

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Abstract

The distribution of *Trimorphodon tau* Cope, 1869 in Nuevo León, Mexico, is understood on the basis of only a few records from the municipality of Iturbide and the central portion in the municipality of Monterrey, both in the southern portion of the state. The most recent record was reported in 2020. We provide new information on specimens from the collection of the Universidad Autónoma de Nuevo León and photographic vouchers, which extend the known geographic range of this species to the northern portion of the state. We also review the scutellation in the new specimens and other specimens cited in the literature.

Keywords

Lepidosis, Mexican Lyre Snake, physiographic region, range extension, Sierra Madre

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Introduction

The Mexican Lyresnake, *Trimorphodon tau* (Cope 1869), is endemic to Mexico. This snake is widely distributed along the coastal slopes and foothills of the Sierra Madre Oriental, Sierra Madre Occidental, and Sierra Madre del Sur, as well as across the Mexican Plateau and the Mesa de Oaxaca (Lazcano et al. 1992; Nevárez-de los Reyes 1999; Contreras-Lozano 2006; Lazcano et al. 2010; Lemos-Espinal et al. 2016; Nevárez-de los Reyes et al. 2016; Heimes 2016). Although the species has been reported from elevations of 100–2600 m (Heimes 2016), in most of its range it occurs between 1000 and 2100 m (McDiarmid and Scott 1970).

Some authors recognize two subspecies within *Trimorphodon tau*: *T. tau tau* and *T. t. latifasciata* Heimes 2016). Whether these two taxa represent distinct species or pattern phases of a single species remains to be

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ascertained. Currently, the range of *T. t. tau* is "in western Mexico from southern Sonora southward to Jalisco, then across the Mesa Central to eastern Mexico where it is found from south Tamaulipas and Nuevo León southward to central Oaxaca" and *T. t. latifasciata* "on the Pacific versant from southern Jalisco southward to central Guerrero and in the Río Balsas Depression as far as southwestern Puebla and northwestern Oaxaca" (Heimes 2016: p.198). According to Scott and McDiarmid (1984), *T. t. tau* usually has a pale- to medium-gray hood with a pale snout and/or prefrontal band, coupled with a full interocular band and variable parietal markings, whereas *T. t. latifasciata* has a dark-gray hood usually lacking prefrontal and interocular bars, as well as discrete parietal markings; the snout is usually dark colored.

McDiarmid and Scott (1970) and Scott and McDiarmid (1984) did not include Nuevo León in the distribution of *Trimorphodon tau*, even though Martín del Campo (1953) reported it from Cerro de la Silla. It was also reported from the state by Blody et al. (1987). To date, it has been reported from disjunct localities in the central part of the state (Lemos-Espinal et al. 2018). Although this species is widely distributed in Mexico, records in Nuevo León are scarce and are restricted to the portion of the Sierra Madre Oriental; however, we provide here new information that in Nuevo León it is not restricted to mountainous areas but also inhabits low and semi-desert areas, suggesting that its distribution could extend further north and west in the state.

Methods

We reviewed of the specimens deposited in the herpetological collection of the Universidad Autónoma de Nuevo León (UANL). We currently have 10 specimens of *T. tau* from Nuevo León, three of which have been previously cited in the literature (UANL 3917, 3918, and 5243); the remaining seven are deposited in the UANL collection, including two photographic vouchers (UANL 8542 and 8543). We identified the specimens using the criteria of McDiarmid and Scott (1970). We examinated eight morphological features of lepidosis, including midbody dorsal scale row number, numbers of ventrals, subcaudals, total segmental counts, number of body bands and tail bands, total number of body and tail bands, and collar length in middorsal scale numbers. Two specimens are incomplete; one of them (UANL 1229) is missing part of the ventral scales, whereas the other one (UANL 4370) is missing a portion of the tail. We gathered morphological measurements using digital calipers (precision 0.01 mm). In order to establish the geographic location of specimens collected prior to the establishment of the standard coordinate system (datum WGS84), we determined the location using Google Earth, employing the registered localities as reference points. Subsequently, we created shape files to build a geographic information system (GIS), which we then used to generate a locality map using QGIS v. 3.16 (Fig. 1).

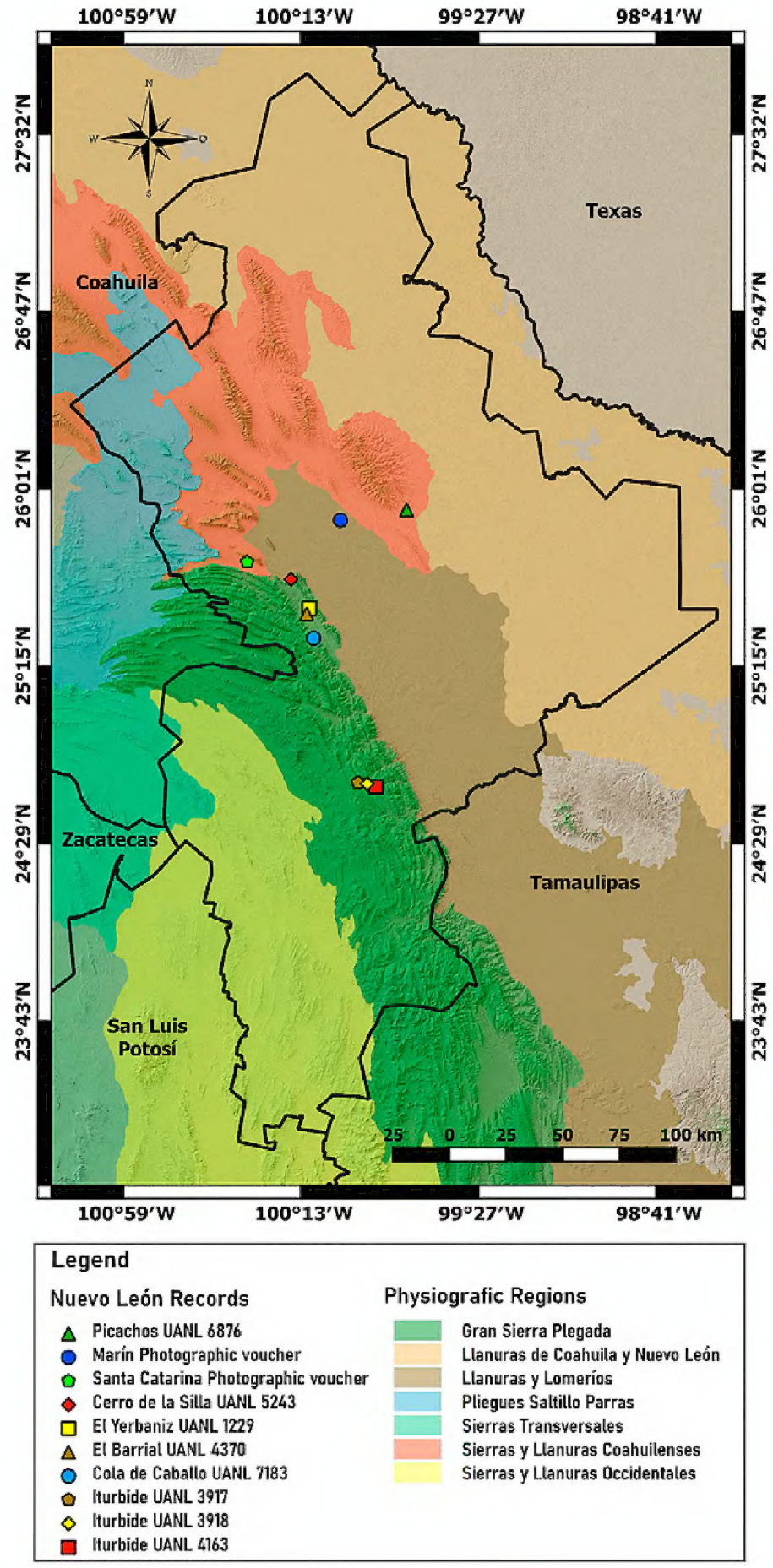

Figure 1. Distribution of *Trimorphodon tau* in Nuevo León, Mexico. From north to south, the new records are: UANL 6876 (green triangle), Marín photographic voucher (blue circle) and Santa Catarina photographic voucher (light green pentagon). Previously known records are: UANL 5243 (red diamond), UANL 1229 (yellow square), UANL 4730 (brown triangle), UANL 7183 (light blue circle), UANL 3917 (brown pentagon), UANL 3918 (yellow diamond) and UANL 4163 (red square).

Results

Previously, *T. tau* was only registered for the municipalities of Monterrey, Santiago, and Iturbide in the Sierra Madre Oriental, at elevations of 760-1,770 m in the central and southern portions of this mountainous area. These specimens are preserved in the collection of the Universidad Autónoma de Nuevo León (UANL) and are cited in the literature. Additionally, three new records have been confirmed for the state, two in the municipalities of Santa Catarina and Dr. González and another one in the municipality of Marín.

New records. MEXICO – **Nuevo León** • Dr. González, Sierra Picachos, 25°55′20.03″N, 099°45′32.98″W, 440 m alt.; 6.V.2006; Jorge Armando Contreras-Lozano, leg.; 1 ♀; TL 888 mm; UANL 6876 • Marín, Facultad de Agronomía UANL, 25°52′27.54″N, 100°02′42.56″W, 360 m alt.; 13.X.2017; Alejandro Mota-Cortez, obs., 1 sex indet.; UANL 8542 • Santa Catarina, Cerro de las Mitras, 25°41′36.24″N, 100°26′49.92″W, 700 m alt.; 12.III.2020; Roberto García-Barrios, obs., 1 ♂.; UANL 8543 (Fig. 2).

Other specimens examined. MÉXICO – **Nuevo León** • Monterrey, Cerro de la Silla, 24°44′34.48″N, 099°58′12.10″W, 760 m alt.; XII.1991; Manuel Nevárez-de los Reyes leg.; 1 ♀; TL 236 mm; UANL 5243 • Iturbide, carr. 58 km 53 Santa Elena Canyon, 24°44′34.48″N, 099°58′12.10″W, 1770 m alt.; 15.IX.1990; David Lazcano, Alan Kardon, Karl Peterson leg.; 1 ♀; TL 680 mm; UANL 3917 • Iturbide, carr. 58 km 47 Santa Elena Canyon, 24°44′15.66″N, 099°55′49.21″W, 1400 m alt.; same date; same collectors, leg.; 1 ♀; TL 468 mm; UANL 3918 • Iturbide, carr. 58 km 42 entrance to Iturbide, 24°43′27.78″N, 099°53′32.56″W, 1450 m alt.; 18.VII.1996; David Lazcano, Alan Kardon, and Javier Banda-Leal, leg.; 1 ♂; TL 572 mm; UANL 4163 • Santiago, El Yerbaniz, 25°29′37.84″N, 100°10′47.10″W, 500 m alt.; IX.1973; Octavio Anaya, leg.; 1 ♂; TL 281 mm; UANL 1229. • Santiago, El Barrial, 25°28′11.69″N, 100°11′26.70″W, 540 m alt.; IX.1993; Manuel Nevárez-de los Reyes, leg.; 1 ♀; TL 193 mm; UANL 4370 • Santiago, Cola de Caballo, 25°21′55.63″N, 100°09′39.67″W, 720 m alt: Jason Jones and Chris Gruenwald, leg.; 1 ♀; TL 485 mm; UANL 7183.

Identification. Meristic data measurements are given in Table 1. The specimens collected from Nuevo León were identified from the following combination of characters, which closely match the diagnostic features given by McDiarmid and Scott (1970). The scutellation features of *T. tau* are as follows: ventral scales 201–231 and subcaudal scales 61–85 in males, 210–243 and 55–80 in females; total ventrals plus subcaudals 265–319; cloacal scute divided; usually 2 (2–5) loreals; 3 (1–4) preoculars; 3 (2–4) postoculars; 3 (1–5) primary temporals; 4 (2–5) secondary temporals; 8 (7–10) supralabials, with fourth and fifth (or third to sixth) bordering eye; 12 (9–14) infralabials, usually separated by chin shields up to the sixth (fourth–seventh) infralabial; dorsal scales in 22, 23, or 24 (21–27) rows one head length behind head, 22 or 23 (17–25) rows at midbody, and 15 or 16 (14–18) rows one head length before the vent. Usually the dorsum is gray, tan, or pale brown and patterned with 18–46 transverse bands that reach the margins of the ventral and subcaudal scales. The bands have several

Figure 2. Photograph in life of the Santa Catarina record. Photo by Roberto García-Barrios.

Table 1. *Trimorphodon tau* from Nuevo León in the UANL collection.

Specimen	Sex	Total Length (mm)	Mid-body dorsal scale rows	Ventral	Subcaudal	Ventral-subcaudal	Body bands	Tail bands	Body-tail bands	Collar length
UANL-6876	♀	888	22	228	58	286	31	12	43	9
UANL-5243	♀	236	22	219	72	291	28	16	44	10
UANL-1229	♂	281	22	213	74	287	—	—	—	—
UANL-4370	♀	193	22	229	39 (broken)	269	31	8 (broken)	39	9
UANL-7183	♀	485	22	220	70	290	28	15	43	9
UANL-3917	♀	763	22	231	63	294	32	14	46	9
UANL-3918	♀	468	22	220	69	289	27	13	40	11
UANL-4163	♂	572	22	220	72	292	28	14	42	7

dark brown shadows on the margins. Several of the dark bands have clear central areas, which are sometimes long and diffuse or concentrated in discrete spots, which suggests the division of a band into two or the merger of two bands. The bands decrease in length along the midline from anterior to posterior. Often, the first band is longer than the second. The bands are longer dorsally and narrower laterally. Small spots between the bands sometimes are present. Frequently, the body bands continue laterally onto the ventral scales, giving the belly surface a pattern of irregular spots. In some specimens, however, the ventral scales are immaculate. The head pattern is extremely variable. This pattern consists of a black hood extending from the tip of the snout to the posterior portion of the parietal scales. This hood usually is separated from the first body band by a pale nuchal collar. In some specimens the snout is pale colored. In some cases, there is a pale prefrontal bar, a pale interocular bar, a pale parietal marking, or a pale occipital marking, or a combination of these components. In some specimens most or all of these components of the head pattern can be missing, and the head is uniformly pale brown. The nuchal collar sometimes extends medially over the parietal area connecting with the pale parietal mark and is shaped like a chevron. The anterior edge of the pale nuchal collar is either straight or slightly serrated. The posterior edge of the nuchal collar is almost always straight. The first body blotch is occasionally in contact with the cephalic hood or can be separated by one and one-half to six dorsal scales.

Discussion

Until now, *Trimorphodon tau* in Nuevo León appeared to be mainly distributed in the Sierra Madre Oriental. The additional records are located in the municipality of Iturbide, where the highest elevational record is from 1770 m (UANL 3917). The additional (UANL 7183, 4370, 1229, and 5243) occurrences are located to the north in the central part of the state at Cascada Cola de Caballo and El Barrial, both in the Parque Nacional Cumbres de Monterrey (a natural protected area under federal jurisdiction), and at El Yerbaniz in the municipality of Santiago, as well as in the Monumento Natural El Cerro de la Silla (a natural protected area under state jurisdiction) in the municipality of Monterrey, in the physiographic region Gran Sierra Plegada. However, this snake is not restricted to this region alone.

The photographed specimen from the state protected natural area Cerro de las Mitras (UANL 8543) in the municipality from Santa Catarina is the westernmost record, whereas the photograph of the Marín specimen (UANL 8542) is the lowest elevational record (360 m); both are from the Llanuras y Lomeríos physiographic region. Finally, the northernmost record (UANL 6876) is from the northeastern portion of the state in the municipality of Dr. González, in the Sierra Picachos, which is a state protected natural area and federal priority terrestrial region; this record is northeast of the Metropolitan area of Monterrey, in the Llanuras de Coahuila y Nuevo Léon physiographic region.

The new records extend its range of distribution to the north and west in the state, beyond the mountain mass of the Sierra Madre Oriental. In addition to the record in the Sierra de Picachos, it is very likely that it *T. tau* also occurs in other mountainous areas, such as the Sierra de Gomas and Sierra del Fraile and San Miguel; the latter is also a state protected natural area. There are the federal priority terrestrial regions Sierra de Bustamante and the Popa in western Nuevo León, which have implications for the conservation of the species, as in these areas urban development is restricted and the protection and preservation of wildlife is prioritized, so these areas may serve as a refuge for this species.

Of the three physiographic regions where *T. tau* has been recorded in Nuevo León, two of them, the Gran Sierra Plegada and the Sierras and Llanuras Coahuilenses, are also represented in the state of Coahuila. Therefore, this species might also occurs in these physiographic regions in the state of Coahuila.

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Authors' Contributions

Conceptualization: JBL, DL, MNR. Formal analysis: JBL, CVB. Funding acquisition: DL. Investigation: MNR. Methodology: JBL, CVB. Software: JBL. Supervision: DL, LDW. Validation: LDW. Writing – original draft: JBL. Visualization: JBL. Writing – review and editing: DL, MNR, CVB , LDW.

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